(12) PATENT ABSTRACT (11) Document No. AU-A-48290/96
(19) AUSTRALIAN PATENT OFFICE

(54) Title
WATER BASED HEAT BANK AND FUSION SALT CALORIFIER

International Patent Classification(s)
(51)[6] **F24H 007/02**

(21) Application No. : **48290/96** (22) Application Date : **26/03/96**

(43) Publication Date : **02/10/97**

(71) Applicant(s)
STEPHEN R TRANTER; DAVID E MCCONNELL

(72) Inventor(s)
STEPHEN R TRANTER; DAVID E MCCONNELL

(57) Claim

1. A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER COMPRISING A HEAT BANK CONTAINER WHICH CONTAINS A VOLUME OF WATER BASED FLUID CONTAINING VARYING AMOUNTS OF HEAT ENERGY, DERIVED FROM A SOURCE NOT HEREIN DISCLOSED ,AND WHEREAS THIS HEAT ENERGY CAN BE CIRCULATED AROUND THE HEAT STORAGE VESSEL BY MEANS OF CONVECTIVE CURRENTS AND AN INSULATED BAFFLE WHICH DIRECTS AND INFLUENCES THE CONVECTIVE CURRENT FLOW WHICH FORCES THE HEATED WATER TO THERMAL LAYER AT THE HIGHEST POSSIBLE POINT WITHIN THE HEAT BANK CONTAINER WHERE A FUSION SALT CALORIFIER IS IMMERSED WITHIN THE WATER BASED FLUID AT THE HIGHEST POSSIBLE POINT FOR THE PURPOSE OF HEAT EXCHANGING FROM THE HEATED WATER BASED FLUID TO A CLEAN WATER SUPPLYHELD WITHIN THE CONFINES OF THE FUSION SALT CALORIFIER .

INVENTION TITLE : WATER BASED HEAT BANK AND FUSION SALT CALORIFIER .

THE FOLLOWING STATEMENT IS A FULL DESCRIPTION OF THIS INVENTION , INCLUDING THE BEST METHOD OF PERFORMING IT KNOWN TO ME :-

THIS INVENTION RELATES TO IMPROVEMENTS IN CONFIGURING A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER .

FOR MANY PEOPLE THE INEFFICIENCIES INVOLVED IN THE STORAGE AND UTILISATION OF WARM WATER BASED FLUIDS AND THE METHODS OF TRANSFERRING THIS HEAT , BY MEANS OF A CALORIFIER , FROM A CONTAMINATED WATER BASED FLUID TO CLEAN FLUID HAS BEEN EXPENSIVE AND IMPRACTICAL IN RESPECT OF EFFICIENCY.

A HEAT BANK IS SIMPLY A STORAGE FACILITY WHICH HOLDS A MEDIUM WHICH CONTAINS A CERTAIN AMOUNT OF HEAT ENERGY FOR VARIOUS CONSUMER NEEDS AND FUNCTIONS . A FLUID WHICH IS WATER BASED IS AN IDEAL HEAT ENERGY STORAGE MEDIUM DUE TO THE HIGH SPECIFIC HEAT OF WATER. THE SPECIFIC HEAT AND VISCOSITY OF WATER CAN BE ADJUSTED BY MEANS OF AN ADDITIVE SUCH AS A GLYCOL BASED CHEMICAL .

A FUSION SALT IS A CHEMICAL COMPOUND WITH KNOWN PRECISE MELTING POINTS AND CHARACTERISTICS. THE HEAT OF FUSION PRINCIPLE INVOLVES THE AMOUNT OF HEAT ENERGY THAT IS ATTRACTED OR EXPELLED FROM THESE FUSION SALTS DURING THE PHASE OF ALTERNATING BETWEEN LIQUID AND SOLID STATES WITHOUT AN ALTERATION IN THE TEMPERATURE OF THE FUSION SALT DURING THIS PHASE.THIS PRINCIPAL CAN BE UTILISED TO STORE LARGE QUANTITIES OF HEAT ENERGY AT A STABLE TEMPERATURE FOR EXTENDED PERIODS OF TIME .

A CALORIFIER IS SIMPLY A LIQUID TO LIQUID HEAT EXCHANGER FOR TRANSFERRING HEAT ENERGY FROM ONE FLUID TO ANOTHER BY CONDUCTION THROUGH THE CALORIFIER WALLS . A CALORIFIER WORKS MOST EFFICIENTLY AND EFFECTIVELY WHEN THE HIGHEST DIFFERENTIAL IN TEMPERATURE EXISTS BETWEEN THE FLUID HELD WITHIN ITS CONFINES AND THE FLUID THAT EXISTS AROUND ITS PERIMETER SURFACE AREA PROVIDING THIS DIFFERENTIAL IN TEMPERATURE CAN BE MAINTAINED AND PROVIDING THAT THE MAXIMUM AMOUNT OF INTERNAL AND EXTERNAL SURFACE AREA OF THE CALORIFIER IS EXPOSED AND AVAILABLE TO ALLOW THE EXCHANGE OF HEAT ENERGY .

MANY OF THE CURRENT SYSTEMS OF HEAT BANKS AND CALORIFIERS DO NOT ADEQUATELY MEET THESE REQUIREMENTS OR SATISFY CONSUMER NEEDS DUE TO THE INABILITY OF HEAT BANKS TO STORE SUFFICIENT ENERGY FOR CONSUMER NEEDS AND THE LACK OF EFFICIENCY AND COST EFFECTIVENESS OF CURRENTLY AVAILABLE CALORIFIERS .

THESE PROBLEMS ARE OVERCOME BY THE PRESENT INVENTION WHICH PROVIDES AN EFFECTIVE COMBINATION OF A WATER BASED HEAT BANK, WHICH IS CAPABLE OF HOLDING ,WITHIN ITS CONFINES , A LARGE AMOUNT OF HEAT ENERGY, FROM A HEAT SOURCE NOT HEREIN DISCLOSED, AND A FUSION SALT CALORIFIER , WHICH IS STRATEGICALLY LOCATED IN A HIGH POSITION , WITHIN THE HEAT BANK,WHICH AFFORDS THE HIGHEST AMOUNT OF HEAT ENERGY.THE FUSION SALT MEDIUM, WHICH HAS HIGH HEAT OF FUSION CHARACTERISTICS, IS STRATEGICALLY PLACED IN A SEALED SHELL AROUND THE CALORIFIER TO ENABLE A LARGE AMOUNT OF HEAT ENERGY TO BE STORED AND HEAT EXCHANGED AT A KNOWN AND PRECISE TEMPERATURE , NOT HEREIN DISCLOSED .

BY USING A CONVECTIVE CURRENT ,WITHIN THE WATER BASED HEAT BANK, THE HEAT THAT IS EXCHANGED , FROM A SOURCE NOT HEREIN DISCLOSED , TO THE WATER BASED FLUID WILL RISE TO THE AREA , WITHIN THE WATER BASED HEAT BANK , IN WHICH THE FUSION SALT CALORIFIER IS LOCATED THEREBY ENABLING A CONDUCTIVE HEAT EXCHANGE TO OCCUR FROM THE WATER BASED FLUID THROUGH THE SEALED OUTSIDE CONTAINER WALLS OF THE CALORIFIER TO THE FUSION SALT . AT A KNOWN TEMPERATURE , NOT HEREIN DISCLOSED , THE FUSION SALT WILL CHANGE FROM A CRYSTALLINE STATE TO A FLUID STATE THEREBY ABSORBING A LARGE AMOUNT OF HEAT ENERGY . THIS HEAT ENERGY WILL THEN BE HEAT EXCHANGED , BY CONDUCTION ,TO THE FLUID HELD WITHIN THE CONFINES OF THE SEALED INNER CONTAINER WALLS OF THE CALORIFIER CONSEQUENTLY HEATING THE FLUID TO A HIGHER TEMPERATURE . THIS HEAT EXCHANGE WILL CONTINUE FOR AN EXTENDED PERIOD , DUE TO THE HIGH AMOUNT OF HEAT ENERGY HELD WITHIN THE FUSION SALT IN LIQUEFIED FORM , UNTIL THE FUSION SALT LIQUID GIVES UP SUFFICIENT HEAT ENERGY TO RETURN TO ITS CRYSTALLINE FORM

THESE FUSION SALT CRYSTALS WILL AGAIN BE HEATED BY THE WATER BASED FLUID BY CONDUCTIVE HEAT EXCHANGE THROUGH THE SEALED OUTSIDE CONTAINER WALLS OF THE FUSION SALT CALORIFIER, WHICH WILL RETURN TO A LIQUID FORM , PROVIDING THE WATER BASED FLUID IN THE HEAT BANK CONTAINS ENOUGH HEAT ENERGY TO TRANSFORM THE FUSION SALT FROM CRYSTALLINE STATE TO A LIQUID STATE .

AFTER EXCHANGE OF HEAT ENERGY FROM THE WATER BASED FLUID , HELD BY THE EFFECT OF THERMAL LAYERING AT THE HIGHEST POSSIBLE LEVEL WITHIN THE WATER BASED HEAT BANK, TO THE FUSION SALTS , HELD WITHIN THE CONFINES OF THE SEALED OUTER CONTAINER WALL OF THE CALORIFIER , A CONVECTION CURRENT WILL FORCE THE NOW COOLER , DENSER ,WATER BASED FLUID AWAY FROM THE FUSION SALT CALORIFIER TO BE REPLACED WITH THE WARMER LESS DENSE WATER BASED FLUID WHICH CONTAINS A HIGHER HEAT ENERGY .

THE WATER BASED HEAT BANK WOULD HAVE AN OVERFLOW OUTLET ATTACHED TO IT AT ITS UPPER LEVEL TO ALLOW EXCESS EXPANDED FLUIDS TO BE DISCHARGED .THE WATER BASED HEAT BANK WOULD ALSO HAVE AN INSULATED BAFFLE LOCATED BELOW THE FUSION SALT CALORIFIER TO COVER THE FULL WIDTH OF THE WATER BASED HEAT BANK CONTAINER TO CHANNEL , ENHANCE AND CONTROL THE CONVECTION CURRENTS UPWARDS AFTER HEATING , BY AN EXTERNAL SOURCE NOT HEREIN DISCLOSED, AND DOWNWARDS AFTER COOLING BY HEAT EXCHANGE TO THE FUSION SALT CALORIFIER .

THE FUSION SALT CALORIFIER IS ATTACHED BY HOLLOW TUBING TO A CLEAN WATER SOURCE AND BY HOLLOW TUBING TO A CONSUMER OUTLET POINT AND THESE TUBINGS WOULD HAVE ALL THE NECESSARY SAFETY AND CONTROL VALVES INSTALLED SUCH AS A PRESSURE REDUCTION VALVE TO LOWER THE PRESSURE WITHIN THE SYSTEM , A TEMPERATURE MIXING VALVE , WITH A CALORIFIER BYPASS HOLLOW TUBING ATTACHED TO CONTROL THE MIXING OF THE WATER OUTLET TEMPERATURE TO THE CONSUMER , A COMBINATION TEMPERATURE AND EXPANSION CONTROL VALVE TO ENSURE THE SAFETY OF THE WHOLE SYSTEM AND THE SAFETY OF THE CONSUMERS UTILISING THE HEATED WATER PRODUCED BY THE SYSTEM AND AN OUTLET POINT FOR CONSUMER ACCESS TO THE WATER .

TO ASSIST WITH THE UNDERSTANDING OF THIS INVENTION , REFERENCE WILL NOW BE MADE TO THE ACCOMPANYING DRAWING , FIGURE 1 , WHICH SHOWS THE CONFIGURATION OF THE SYSTEM .

REFERRING TO FIGURE 1 , IT CAN BE SEEN THAT THE WATER BASED HEAT BANK AND FUSION SALT CALORIFIER ACCORDING TO THIS INVENTION COMPRISES A CLEAN WATER SUPPLY POINT (1) , A PRESSURE REDUCING VALVE (2) , A CLEAN WATER INLET POINT (3) , A CLEAN WATER BYPASS LINE (4) , CLEAN WATER (5) STORED WITHIN THE CONFINES OF A FUSION SALT CALORIFIER(12,13,14) , A CLEAN WATER OUTLET POINT (6) , A COMBINATION TEMPERATURE AND EXPANSION CONTROL VALVE (7) , A WATER TEMPERATURE MIXING VALVE (8) , A CLEAN WATER OUTLET POINT (9) , A HEAT BANK CONTAINER (10), A WATER BASED FLUID (11) , A FUSION SALT CALORIFIER (12,13,14,) COMPRISING A SEALED INNER STORAGE CONTAINER (12) , A SEALED OUTER STORAGE CONTAINER (13) , FUSION SALT (14) , AN INSULATED BAFFLE (15) , A SCHEMATIC INDICATOR SHOWING THE CONVECTIVE CURRENT CYCLE (16) , A COLD WATER BASED FLUID OUTLET POINT (17) A WARM WATER BASED FLUID INLET POINT (18) AND AN OVERFLOW OUTLET POINT (19) .

WHEN A WATER BASED FLUID (11) IS STORED IN A HEAT BANK CONTAINER (10) THE AMOUNT OF HEAT ENERGY STORED IN THE WATER BASED FLUID (11) IS DEPENDANT UPON ITS TEMPERATURE . WATER BASED FLUID (11) ALWAYS CONTAINS SOME HEAT ENERGY AND THIS CAN BE HARNESSED AND HEAT EXCHANGED TO CLEAN WATER (5) BY MEANS OF A FUSION SALT CALORIFIER (12,13,14), PROVIDING THERE IS A DIFFERENTIAL IN TEMPERATURE BETWEEN THE CLEAN WATER (5) AND THE WATER BASED FLUID BY USING CONVECTIVE CURRENTS (16) AND THE PRINCIPAL OF THERMAL LAYERING TO MOVE AND CONCENTRATE , AT THE TOP OF A HEAT BANK CONTAINER (10), A QUANTITY OF HEATED WATER BASED FLUID (11) CONTAINING A CERTAIN AMOUNT OF HEAT ENERGY WHERE THE CALORIFIER (12,13,14) IS LOCATED , REQUIRES A STRATEGIC INPUT OF HEAT ENERGY ON ONE SIDE OF AN INSULATED BAFFLE (15) STRATEGICALLY LOCATED WITHIN THE HEAT BANK CONTAINER (10), FROM A SOURCE AND BY A METHOD NOT HEREIN DISCLOSED AND A STRATEGIC REMOVAL AND REHEATING OF COOLER WATER BASED FLUID (11) , BY A METHOD NOT HEREIN DISCLOSED, FROM THE OPPOSITE SIDE OF AN INSULATED BAFFLE (15) .

THIS WOULD THEN CAUSE THE CONVECTIVE CURRENT (16) TO OCCUR WHICH WOULD FORCE THE HEATED WATER BASED FLUID (11) TO RISE AND THE COOLER WATER BASED FLUID (11) TO SINK . THE HEATED WATER BASED FLUID (11) WOULD REMAIN , IN A THERMAL LAYER , AT THE HIGHEST POINT WITHIN THE HEAT BANK CONTAINER (10) ALLOWING FULL SURFACE AREA CONTACT WITH THE SEALED OUTER STORAGE CONTAINER (13) WALL OF THE FUSION SALT CALORIFIER (12,13,14) WHICH IS FULLY IMMERSED WITHIN THIS WARM THERMAL LAYER OF WATER BASED FLUID (11) . PROVIDING THERE IS A DIFFERENTIAL IN TEMPERATURE A HEAT EXCHANGE WOULD OCCUR FROM THE HEATED WATER BASED FLUID (11) THROUGH THE SEALED OUTER STORAGE CONTAINER (13) WALL OF THE CALORIFIER (12,13,14) TO THE FUSION SALT (14) HELD BETWEEN THE SEALED OUTER STORAGE CONTAINER (13) WALL AND THE SEALED INNER STORAGE CONTAINER (12) WALL OF THE CALORIFIER (12,13,14) . PROVIDING THE TEMPERATURE WAS EQUAL TO OR OVER THE MELTING POINT OF THE FUSION SALT (14) THE FUSION SALT (14) WOULD MELT FROM A CRYSTALLINE STATE TO A LIQUID STATE AND THEREBY , BY THE HEAT OF FUSION CHARACTERISTICS OF THE FUSION SALT (14), ABSORB A LARGE AMOUNT OF HEAT ENERGY . PROVIDING THERE WAS A DIFFERENTIAL IN TEMPERATURE BETWEEN THE FUSION SALT (14) AND THE CLEAN WATER (5) THERE WOULD BE A HEAT EXCHANGE THROUGH THE SEALED INNER STORAGE CONTAINER (12) WALLS OF THE FUSION SALT CALORIFIER (12,13,14) THEREBY INCREASING THE AMOUNT OF HEAT ENERGY HELD BY THE CLEAN WATER (5).THIS HEAT EXCHANGE WOULD CONTINUE UNTIL A POINT OF EQUILIBRIUM IN TEMPERATURE WAS REACHED .BETWEEN THE WATER BASED FLUID (11) THE FUSION SALT CALORIFIER (12,13,14) AND THE CLEAN WATER (5) .

BY UTILISING A FUSION SALT(14) , WHOSE FORMULA IS NOT HEREIN DISCLOSED , THE MELTING POINT , WHICH IS NOT HEREIN DISCLOSED , OF WHICH IS KNOWN AND PREDICTABLE AND CONTAINS A MUCH LARGER AMOUNT OF ENERGY AT THIS TEMPERATURE , WHEN COMPARED TO AN EQUIVALENT AMOUNT OF WATER BASED FLUID , DUE TO THE HEAT OF FUSION CHARACTERISTICS OF THE FUSION SALT (14), WILL ENSURE A FURTHER AND PROLONGED HEAT EXCHANGE TO OCCUR TO THE CLEAN WATER(5), WHEN COMPARED TO AN EQUIVALENT AMOUNT OF WATER BASED FLUID (11) , AS AND WHEN REQUIRED .

A TEMPERATURE DROP OCCURS IN THE FUSION SALT CALORIFIER WHEN THE CLEAN WATER OUTLET POINT (9) IS OPENED AND PRESSURISED CLEAN WATER FLOWS THROUGH THE FUSION SALT CALORIFIER (12,13,14). CLEAN WATER (5) OF A LOWER TEMPERATURE IS FORCED BY PRESSURE FROM AN OUTSIDE SOURCE (1) THROUGH A PRESSURE REDUCING VALVE(2) TO THE INLET POINT (3) IN THE CALORIFIER(12,13,14) THEREBY FORCING CLEAN WATER(5) OUT OF THE CALORIFIER (12,13,14) CLEAN WATER OUTLET POINT (6) , PAST THE COMBINATION TEMPERATURE AND EXPANSION CONTROL VALVE (7) AND THROUGH THE WATER TEMPERATURE MIXING VALVE(8) , WHICH REGULATES THE FLOWS OF CLEAN WATER (5) BY MIXING THE CLEAN WATER OUTLET POINT (6) CLEAN WATER (5) WITH CLEAN WATER FROM THE CLEAN WATER SUPPLY POINT (1) THROUGH A CLEAN WATER BYPASS LINE (4) AND THEN ON TO THE CLEAN WATER OUTLET POINT (9) .

THE FUSION SALT (14) DRAWS HEAT ENERGY THROUGH THE THERMALLY CONDUCTIVE SEALED OUTER STORAGE CONTAINER (13) WALL FROM THE WARM WATER BASED FLUID (11) WHICH FULLY ENVELOPES THE CALORIFIER (12,13,14) , THEREFORE IF THE HEAT ENERGY AVAILABLE IS SUFFICIENT TO REACH THE MELTING POINT OF THE FUSION SALT , THE FUSION SALT (14) WILL TRANSFORM FROM A CRYSTALLINE STATE TO A LIQUID STATE AND CONSEQUENTLY HEAT EXCHANGE TO THE CLEAN WATER (5) THROUGH THE SEALED INNER STORAGE CONTAINER (12) WALL UNTIL THE WATER BASED FLUID (11) TEMPERATURE , THE FUSION SALT (14) TEMPERATURE AND THE CLEAN WATER (5) TEMPERATURE REACH A POINT OF EQUILIBRIUM . THE WATER BASED FLUID (11) WILL , BY CONVECTIVE CURRENT , BE REPLACED WITH WATER BASED FLUID (11) OF A GREATER AMOUNT OF HEAT ENERGY AND REPEAT THE ABOVE CYCLE AS NECESSARY .

BY USING AN INSULATED BAFFLE (15) LOCATED AT A POSITION LOWER IN THE HEAT BANK STORAGE CONTAINER (10) AND A WATER BASED FLUID (11) HEATED BY A SOURCE NOT HEREIN DISCLOSED WITH A WARM WATER BASED FLUID INLET POINT (18) LOCATED ON ONE SIDE OF THE INSULATED BAFFLE (15) AND A COLD WATER BASED FLUID OUTLET POINT (17) , TO A REGION AND BY A METHOD NOT HEREIN DISCLOSED , LOCATED ON THE OPPOSITE SIDE OF THE INSULATED BAFFLE (15) WILL CREATE A CONVECTIVE CURRENT (16) TO OCCUR WITHIN THE HEAT BANK CONTAINER (10) THEREBY REPLACING THE COOLER WATER BASED FLUID (11) AT THE TOP THERMAL LAYER AT THE TOP OF THE HEAT BANK STORAGE CONTAINER (10) WITH THE WARMER WATER BASED FLUID (11) . BY THERMAL HEAT LAYERING THIS WARM WATER BASED FLUID (11)WILL REMAIN THERE UNTIL REPLACED BY A WATER BASED FLUID (11) OF HIGHER THERMAL CONTENT THUS COMPLETING THE FULL CYCLE .

THE HEAT ENERGY HELD IN THE WATER BASED FLUID (11) WHICH IS HELD WITHIN THE CONFINES OF THE HEAT BANK CONTAINER (10) WILL , BY CONDUCTIVE TRANSMISSION , HEAT EXCHANGE , THROUGH THE CONTAINER WALLS OF THE HEAT BANK STORAGE CONTAINER (10) , TO THE SURROUNDING AIR AND CAUSE A CONVECTIONAL AIR FLOW TO OCCUR WHICH WILL WARM OR COOL THE AIR SPACE ADJACENT TO THE HEAT BANK STORAGE CONTAINER (10) PROVIDING THERE IS A DIFFERENTIAL IN TEMPERATURE BETWEEN THE WALL OF THE HEAT BANK CONTAINER (10) AND THE AIR COMING INTO CONTACT WITH IT .

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS :

1. A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER COMPRISING A HEAT BANK CONTAINER WHICH CONTAINS A VOLUME OF WATER BASED FLUID CONTAINING VARYING AMOUNTS OF HEAT ENERGY, DERIVED FROM A SOURCE NOT HEREIN DISCLOSED ,AND WHEREAS THIS HEAT ENERGY CAN BE CIRCULATED AROUND THE HEAT STORAGE VESSEL BY MEANS OF CONVECTIVE CURRENTS AND AN INSULATED BAFFLE WHICH DIRECTS AND INFLUENCES THE CONVECTIVE CURRENT FLOW WHICH FORCES THE HEATED WATER TO THERMAL LAYER AT THE HIGHEST POSSIBLE POINT WITHIN THE HEAT BANK CONTAINER WHERE A FUSION SALT CALORIFIER IS IMMERSED WITHIN THE WATER BASED FLUID AT THE HIGHEST POSSIBLE POINT FOR THE PURPOSE OF HEAT EXCHANGING FROM THE HEATED WATER BASED FLUID TO A CLEAN WATER SUPPLYHELD WITHIN THE CONFINES OF THE FUSION SALT CALORIFIER .

2. A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER OF CLAIM 1 WHEREIN A HEAT BANK CONTAINER WOULD BE CAPABLE OF HOLDING A QUANTITY OF WATER BASED FLUIDS WITH VARYING AMOUNTS OF HEAT ENERGY , DERIVED FROM AN OUTSIDE SOURCE BY A METHOD NOT HEREIN DISCLOSED, FOR THE PURPOSE OF UTILISING THIS STORED WATER BASED FLUID AS A HEAT BANK FOR TRANSFERRING THIS STORED HEAT ENERGY , BY HEAT EXCHANGE ,TO CLEAN WATER HELD WITHIN THE CONFINES OF A FUSION SALT CALORIFIER AND FOR TRANSFERRING THIS STORED HEAT ENERGY FROM THE HEAT BANK CONTAINER WALLS BY MEANS OF EXTERNAL CONVECTIVE AIR CURRENTS

3.A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER OF CLAIM 1 WHEREIN AN INSULATED BAFFLE SYSTEM CAN BE UTILISED TO CREATE AND DIRECT A THERMAL CONVECTIVE CURRENT TO OCCUR BY CREATING A HEAT DIFFERENTIAL ,WITHIN THE WATER BASED FLUID BY A METHOD NOT HEREIN DISCLOSED ,BETWEEN ONE SIDE OF AN INSULATED BAFFLE AND THE OPPOSING SIDE OF AN INSULATED BAFFLE WITH THE EXPRESS PURPOSE OF CREATING A CONVECTIVE CURRENT AND A THERMAL LAYER OF HIGHER THAN AVERAGE ENERGY CONTENT WATER BASED FLUID , WHEN COMPARED TO THE AVERAGE TEMPERATURE OF THE WATER BASED FLUID HELD WITHIN THE CONFINES OF THE HEAT BANK CONTAINER ,TO OCCUR AT THE HIGHEST POSSIBLE POINT IN THE HEAT BANK CONTAINER , ADJACENT TO , AND FULLY ENCLOSING AN IMMERSED FUSION SALT CALORIFIER FOR THE PURPOSE OF HEAT EXCHANGE FROM THE HEATED WATER BASED FLUID TO THE CLEAN WATER HELD WITHIN THE CONFINES OF THE FUSION SALT CALORIFIER

4.A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER OF CLAIM 1 WHEREIN A FUSION SALT CALORIFIER COMPRISING A SEALED INNER STORAGE CONTAINER AND A SEALED OUTER STORAGE CONTAINER BOTH CAPABLE OF THERMAL TRANSMISSION AND WHEREAS THE SEALED INNER STORAGE CONTAINER WOULD CONTAIN CLEAN WATER WHICH WOULD BE CONNECTED TO A CLEAN WATER SUPPLY AT A LOW POINT IN THE FUSION SALT CALORIFIER , BY MEANS OF A TUBULAR CONDUIT HAVING A PRESSURE REDUCING VALVE AND A CLEAN WATER BYPASS LINE INSTALLED WITHIN ITS LENGTH , AND A CLEAN WATER OUTLET AT THE HIGHEST POSSIBLE POINT IN THE FUSION SALT CALORIFIER ,CONNECTED TO A CLEAN WATER OUTLET POINT BY MEANS OF A TUBULAR CONDUIT INCORPORATING A COMBINATION TEMPERATURE AND EXPANSION CONTROL VALVE AND A WATER TEMPERATURE MIXING VALVE CONNECTED TO THE AFOREMENTIONED CLEAN WATER BYPASS LINE

5.A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER OF CLAIM 1 WHEREIN A FUSION SALT CALORIFIER CONTAINING A SEALED INNER STORAGE CONTAINER AND A SEALED OUTER STORAGE CONTAINER BOTH OF THESE CONTAINERS CAPABLE OF THERMAL TRANSMISSION AND WHEREAS THE SEALED OUTER STORAGE CONTAINER WOULD CONTAIN A QUANTITY OF FUSION SALT , WHOSE FORMULA IS NOT HEREIN DISCLOSED , WITH A KNOWN AND PREDICTABLE MELTING POINT , WHICH IS NOT HEREIN DISCLOSED . THIS FUSION SALT WOULD BE CAPABLE OF HOLDING A LARGE AMOUNT OF STORED HEAT ENERGY DURING ITS FUSION STAGE BETWEEN CRYSTALLINE STATE AND LIQUID STATE AND BY THE CYCLE OF HEAT GAIN AND HEAT LOSS CREATED BY THIS INVENTION WOULD CONTINUOUSLY CYCLE BETWEEN CRYSTALLINE STATE AND LIQUID STATE DURING HEAT EXCHANGE FUNCTIONS ENABLING GREATER AMOUNTS OF HEAT EXCHANGE TO BE CARRIED OUT AT A KNOWN AND PREDICTABLE TEMPERATURE .

6.A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER OF CLAIM 1 WHEREIN A HEAT SOURCE , NOT HEREIN DISCLOSED , CAPABLE OF GENERATING SUFFICIENT HEAT ENERGY TO ENABLE THE FUSION SALT TO REACH THE REQUIRED FUSION STAGE AND TO ENABLE A CONVECTIVE CURRENT , AIDED AND ASSISTED BY MEANS OF AN INSULATED BAFFLE LOCATED BELOW THE FUSION SALT CALORIFIER AND IMMERSED WITHIN THE WATER BASED FLUID , TO OCCUR WITHIN THE WATER BASED FLUID HELD WITHIN THE CONFINES OF THE WATER BASED HEAT BANKCONTAINER .

6. A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER OF CLAIM 1 WHEREIN AN INSULATED BAFFLE WOULD BE INSTALLED IN AND TO THE FULL WIDTH OF THE HEAT BANK STORAGE CONTAINER TO INFLUENCE AND DIRECT THE CONVECTIVE FLOW OF HEATED AND COOLED WATER BASED FLUID AND PREVENT THE MIXING AND HEAT EXCHANGE OF WATER BASED FLUIDS DURING A CONVECTIVE CYCLE .

STEPHEN RICHARD TRANTER
26/03/96

DAVID ERIC McCONNELL
26/03/96

ABSTRACT OF INVENTION
A WATER BASED HEAT BANK AND FUSION SALT CALORIFIER IS DISCLOSED .
A CLEAN WATER OUTLET POINT (9) IS OPENED TO ALLOW PRESSURISED CLEAN WATER (5) TO FLOW FROM A PRESSURISED CLEAN WATER SUPPLY (1) THROUGH A SERIES OF TUBES AND VALVES , NAMELY ,VIA A TUBE ,TO AND THROUGH A PRESSURE REDUCTION VALVE (2) INTO A CLEAN WATER SUPPLY LINE (3) TO A FUSION SALT CALORIFIER (12,13,14) AND THEN OUT OF THE FUSION SALT CALORIFIER (12,13,14) VIA A CLEAN WATER OUTLET POINT (6), , VIA A TUBE , TO AND THROUGH A COMBINATION TEMPERATURE AND EXPANSION CONTROL VALVE (7) TO A TEMPERATURE CONTROL MIXING VALVE (8) ,WHICH IS FED ALSO BY A BYPASS LINE (4) FROM THE CLEAN WATER SUPPLY POINT (1), TO CONTROL HOT/COLD MIXING TO A PREDETERMINED AND PRESET TEMPERATURE LEVEL .
WHEN THERE IS A DIFFERENTIAL IN TEMPERATURE BETWEEN THE CLEAN WATER (5) AND THE FUSION SALT CALORIFIER (12,13,14) WHEN THE CLEAN WATER (5) PASSES THROUGH THE FUSION SALT CALORIFIER (12,13,14) AN EXCHANGE OF HEAT ENERGY OCCURS DRAWING HEAT THROUGH THE THERMALLY CONDUCTIVE SEALED INNER STORAGE CONTAINER (12) WALL FROM THE FUSION SALT (14) SEALED BETWEEN THE SEALED INNER STORAGE CONTAINER (12)WALL AND A SEALED OUTER STORAGE CONTAINER (13) WALL OF THE FUSION SALT CALORIFIER (12,13,14) . THIS FUSION SALT (14) , WHOSE FORMULA IS NOT HEREIN DISCLOSED , AFTER HEATING , BY THE METHOD SHOWN LATER , TO A KNOWN MELTING POINT , WHICH IS NOT HEREIN DISCLOSED , CHANGES FROM A CRYSTALLINE STATE TO A LIQUID STATE DRAWING IN A GREAT AMOUNT OF HEAT ENERGY KNOWN AS THE HEAT OF FUSION .
THE HEAT OF FUSION ALLOWS THE FUSION SALT (14) TO REMAIN IN A LIQUID STATE FOR AN EXTENDED PERIOD OF ENERGY EXCHANGE WITHOUT CHANGING ITS MELTING POINT TEMPERATURE . THIS FACT ALLOWS HEAT ENERGY TRANSFER TO CONTINUE FOR AN EXTENDED PERIOD AT A KNOWN TEMPERATURE .

THE FUSION SALT (14) DRAWS HEAT ENERGY THROUGH THE THERMALLY CONDUCTIVE WALL OF THE SEALED OUTER STORAGE CONTAINER (13) WALL FROM THE WATER BASED FLUID (11) WHICH IS TOTALLY ENVELOPING THE CALORIFIER (12,13,14) , THEREFORE IF THE HEAT ENERGY IS SUFFICIENT TO REACH THE MELTING POINT OF THE FUSION SALT , THE FUSION SALT (14) WILL TRANSFORM TO ITS LIQUID STATE AND CONSEQUENTLY HEAT EXCHANGE TO THE CLEAN WATER (5) THROUGH THE SEALED INNER STORAGE CONTAINER (12) WALL UNTIL THE WATER BASED FLUID (11) TEMPERATURE , THE FUSION SALT (14) TEMPERATURE AND THE CLEAN WATER (5) TEMPERATURE REACH A POINT OF EQUILIBRIUM . THE WATER BASED FLUID (11) WILL , BY CONVECTIVE CURRENTS AND THERMAL LAYERING, BE REPLACED WITH WATER BASED FLUID (11) OF A GREATER AMOUNT OF HEAT ENERGY AND REPEAT THE ABOVE CYCLE AS NECESSARY .

BY USING AN INSULATED BAFFLE (15) IMMERSED IN THE WATER BASED FLUID (11) AT A POSITION LOWER IN THE HEAT BANK STORAGE CONTAINER (10) THAN THE FUSION SALT CALORIFIER (12,13,14) AND BY HEATING A WATER BASED FLUID (11) , BY A METHOD AND SOURCE NOT HEREIN DISCLOSED, WITH AN INLET POINT (18) LOCATED ON ONE SIDE OF THE INSULATED BAFFLE (15) AND A COLD WATER OUTLET POINT (17) , FROM A REGION NOT HEREIN DISCLOSED , ON THE OPPOSING SIDE OF THE INSULATED BAFFLE (15) WILL CREATE A CONVECTIVE CURRENT (16) TO OCCUR THEREBY REPLACING THE COOLER WATER BASED FLUID (11) AT THE TOP THERMAL LAYER AT THE TOP OF THE HEAT BANK STORAGE CONTAINER (10) WITH THE WARMER WATER BASED FLUID (11) . BY THERMAL HEAT LAYERING THIS WARM WATER BASED FLUID (11)WILL REMAIN THERE UNTIL REPLACED BY A WATER BASED FLUID (11) OF HIGHER THERMAL CONTENT THUS COMPLETING THE FULL CYCLE .

THE HEAT ENERGY HELD IN THE WATER BASED FLUID (11) WHICH IS HELD WITHIN THE CONFINES OF THE HEAT BANK CONTAINER (10) WILL , BY CONDUCTIVE HEAT EXCHANGE , THROUGH THE OUTSIDE WALLS OF THE HEAT BANK STORAGE CONTAINER (10) , WARM THE SURROUNDING AIR COMING INTO CONTACT WITH THE WALLS OF THE WATER BASED HEAT BANK CONTAINER (10)AND CAUSE A CONVECTIONAL AIR FLOW TO OCCUR WHICH WILL WARM THE AIR SPACE ADJACENT TO THE HEAT BANK STORAGE CONTAINER (10) .

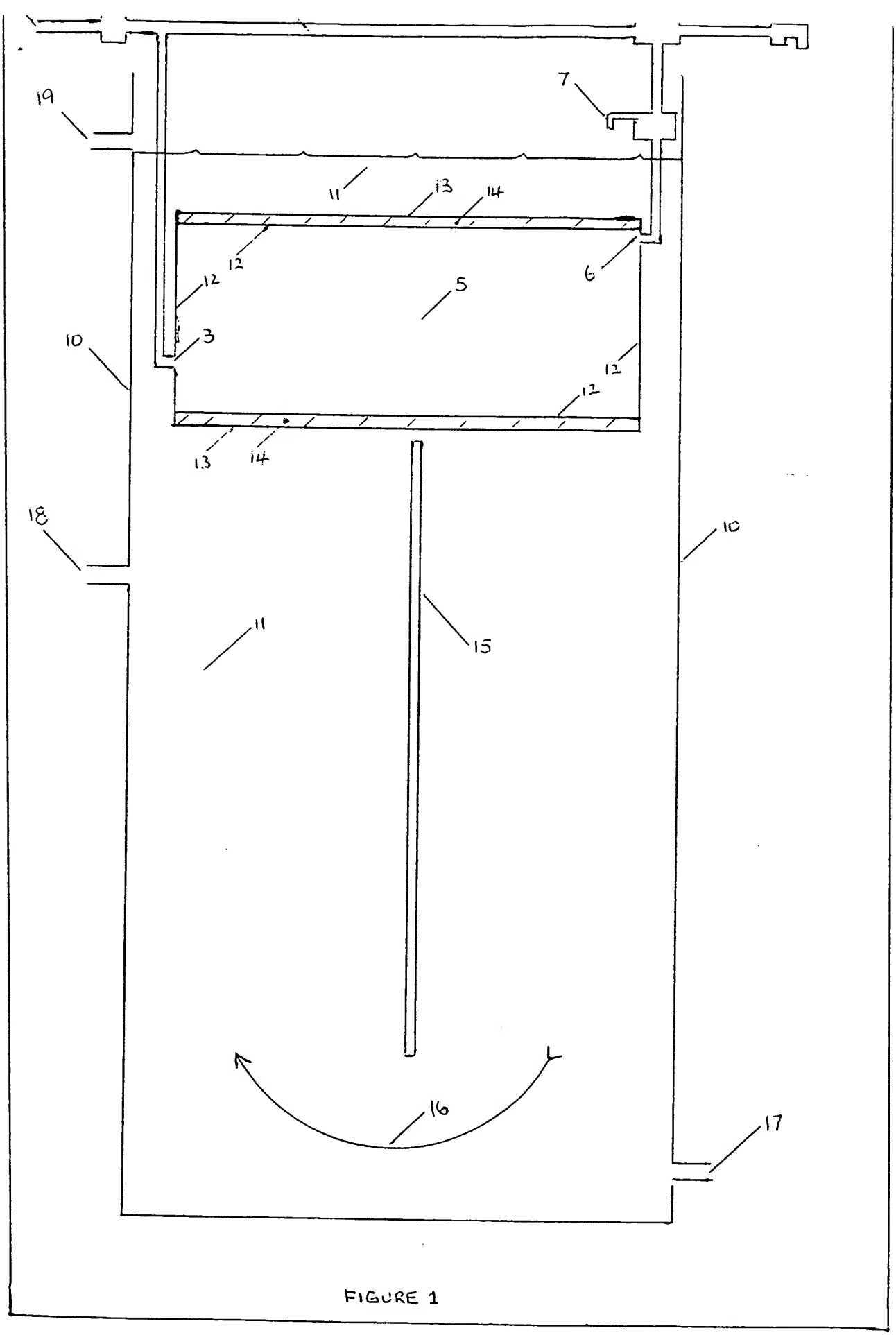

FIGURE 1

PATENTS-TRADE MARKS-DESIGNS

Payment Options

20 JAN 2000 PM

EDF&S DESPATCHED

Cash - Cash is accepted in person only at a State Office. Please do not post cash.

Cheque/Money Order - Cheques/money orders, payable to IP Australia are accepted in person or by post. Cheques/money orders should be Australian currency.

EFTPOS - Debit cards are accepted in person only at a State Office. Transaction minimum $10.00, no cash out.

Electronic Funds Transfer - EFT is available. Please contact 1300 361 541 to arrange.

Credit Card - Credit card payments are accepted in person at a State Office or by post or fax. Transaction minimum $10.00, maximum $15,000.00.

Payer Details

Name: Cynthia Seal

Address: 2925 Briar Park, Ste 930
Houston, TX 770[illegible]42

IPA Customer No. (if known): 5 0 0 2 0 9 6 8

Date: 01/01/00

Phone: (713) 334-5151

Fax: (713) 334-5157

Service Details

Examples: New application in name of (provide name)/Registration of Trade Mark (provide TM No.)/Request for Examination of Patent (provide Patent No.)/etc.

Type of service required: Copy of patent application

Application/ Registration Nos (if known): AU 964 8290 A

If you are not paying by credit card, please enter the amount being paid: $

Credit Card Details

MasterCard [X]

VISA Card [ ]

Bankcard [ ]

Name on Card: Cynthia G. Seal

$ 15.00 + shipping

Please charge this amount to my credit card

Signature: Cynthia G. Seal

Post to: IP Australia, PO Box 200, Woden ACT 2606

Fax to: (02) 6283 2734 (secure fax line for confidential payment details)

Enquiry Ph: 1300 361 541 (financial enquiries)

For statistical purposes only.
Please provide an estimate of the time taken to complete this form hrs [ ] mins [ ]

Office Use Only

Received on: / /

Receiver of Public Money:

Receipt No.: 1025869

Batch No.:

RECEIVED TIME 18. JAN. 5:35 PRINT TIME 18. JAN. 8:44

AUSTRALIA
PATENTS - TRADE MARKS - DESIGNS

PO Box 200 Woden ACT 2606 Tel: (02) 6283 2211
Financial Enquiries: 1300 361 541 Fax: (02) 6283 2734
International: +612 6283 2211 Telex: COMPAT AA 61517

Sales Order

SEAL CYNTHIA
2925 BRIAR PARK ST930
HOUSTON TEXAS 77042 ....

Customer Number: 50020968

Sales Order Number : **40023459**
Date : 21.01.2000

Item	Description	Qty	Price	Unit	Value
1	Photocopy of Patent Specification	1	$15.00	EA	$15.00
Total					**$15.00**